



CALIFORNIA  
TABLE GRAPE  
COMMISSION

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## Guidelines for Use of California Table Grape Powder in Health Research Studies

### Background on the Freeze-Dried Whole Table Grape Powder

The grape powder provided by the California Table Grape Commission (commission) is made from whole California grapes; it is not an extract.

Any results observed in feeding studies using grape powder should be directly attributed to grape consumption. The grapes have been provided in freeze-dried, powdered form. The powder is not made available for commercial use or sale. It was created solely for the purpose of providing researchers with access to California grapes year-round to ensure solid, reproducible data.

The freeze-dried table grape powder is made from a composite of fresh red, green, and black California grapes, based on actual consumption patterns of consumers. It is a mix of seeded and seedless varieties that have been frozen, ground with food-quality dry ice, freeze-dried, and re-ground using Good Manufacturing Practices for food products throughout. A small amount of silica (1% by weight) is used as a flow agent. The powder was processed and stored to preserve the integrity of the biologically active compounds found in fresh grapes. As with fresh grapes, the powder is known to contain polyphenols, including resveratrol, flavans (including catechin), flavonols (including quercetin), anthocyanins, and simple phenolics.

One serving of fresh grapes (3/4 cup or 126 g) is equivalent to 23 g of the commission freeze-dried whole table grape powder.

### Table Grape Extract Available for Use in Cell Studies

The commission will provide the grape powder extract needed for funded proposals conducting *in vitro* work.

### Table Grape Powder Use in Animal Feeding Studies

For animal studies, the table grape powder and placebo should be incorporated into the animal diet to ensure control over the amount fed and consumed. This should be done in a manner that will minimize exposure to heat processes and oxidation, and with careful attention to diet formulation to make sure that the control diets are normalized to the experimental diets so that the percentage of calories from protein, carbohydrate, and fat are matched. To this end, the commission recommends that experimental diets be ordered through an established organization with expertise in grape diets, and will work with grantees to facilitate this.

Note: Table grape powder should NOT be provided in the animal's drinking water. In water it doesn't dissolve, but creates a fairly thick suspension which may not be accepted well by animals, and could inhibit the ability to get the full dose of grape powder. Grape powder can be administered as a

suspension by gavage to ensure the entire dose of grapes is consumed, however this typically requires special expertise and care to avoid animal loss.

Table grape powder should always be stored in the freezer at or below – 20 C. It is hygroscopic in nature, and tends to absorb moisture and clump if exposed to humidity.

### **Recommended Dosage Range for Animal Studies**

3 to 5% grape powder in the diet. (Where 100 g of the final diet contains between 3 and 5 g of grape powder.) In some cases a higher dose between 10% and 15% grape powder may be used to establish Proof of Principle in a given area.

### **Table Grape Powder Use in Human Clinical Studies**

In human studies, the grape powder should be mixed with water, and then consumed all at once as a drink. The following protocol (Appendix A) suggests 6 oz. of water to 46 g of powder, but the amount of water may be adapted to subject's tolerance level, as long as the full dose of grape powder is consumed within 30 minutes.

The table grape powder will be packaged in vacuum-sealed pouches according to the dose approved for the study. The table grape powder is very hygroscopic, so must be protected from moisture and water until reconstituted. Subjects should keep their powder pouches stored in the freezer at all times.

A table grape powder placebo is available for use in control diets.

Recommended dosage range for human studies: between 46 g – 115 g per day (to provide between 2 to 5 servings of grapes per day).

## Appendix A

### Suggested Dosing Protocol for Grape Powder – 46 g Dose\*

#### **Important Information**

- Material should be stored in moisture impermeable packaging at -70 C until weighing.
- Hygroscopic material: protect from water until reconstituted.
- Dose subject within 30 minutes of reconstitution.
- Re-shake material just prior to dosing.

#### **Purpose**

To disperse 46 g of grape powder in 180 mL (6 fl. oz.) of water. \*A larger dose may require more water.

#### **Equipment**

- Ziploc Snap 'n Seal XS container (1 cup) or equivalent.
- Volumetric measuring device.
- Off-the-shelf distilled water (for reconstitution and rinse).

#### **Procedure**

Step	Instructions	Signature/Date
1.	Weigh 46 g of table grape powder into Ziploc Snap 'n Seal XS container and record actual weight. Actual Weight of Powder _____ g	
2.	Add approximately 180 mL (6 fl. oz.) of water to container with table grape powder. Record time of reconstitution. Time of Reconstitution _____	
3.	Close lid tightly and shake for a minimum of 30 seconds.	
4.	Visually confirm that no un-wetted powder remains. Continue shaking if needed.	
5.	Just prior to dosing subject, shake material for a minimum of 30 seconds.	
6.	Dose reconstituted table grape powder to subject. Note: must be dosed within 30 minutes of reconstitution. Time of Dosing _____	
7.	Rinse container with at least 30 mL (1 fl. oz.) of water.	
8.	Dose rinse water to subject.	